K2 Observations of Solar-Like Planet-Hosting Stars in Field 3

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Characterizing planet-hosting stars to get as accurately as possible their masses, radii, and ages is essential to infer the properties of their exoplanets. Planetary mass and radius are only measured relative to the host star, while the age of the star is the best proxy for the age of its planets. Asteroseismology is the best tool to provide accurate stellar masses, radii and ages. The original *Kepler* mission was indeed based on this complementarity. **K2 offers a unique opportunity to characterize by astero-seismology planet-hosting stars outside the original *Kepler* field**. These seismic observations will be essential for future exoplanet missions like CHEOPS that will not do asteroseismology, and that will have some key targets in K2 fields. **K2 is also the tool of choice for exoplanet studies**. K2 observations of transiting planets (2 in Field 3) will allow accurate measurements of their radii that, combined with the mass, will put tight constraints on their internal composition.

We identified in K2 Field 3 one solar-like planet-hosting star that should, according to our SNR computations for 80-day K2 observations, yield detection of oscillations Given the ~5 min pulsation periods expected, **short-cadence observations** are needed:

- HD210277 (EPIC206343913, Kp=6.36): G0 star, with a Jupiter-like planet (1.23 M_{Jup}) in a 442d-period orbit. An excellent target for asteroseismology, including attempting to measure the stellar rotation and inclination from mode splittings. No planetary transits discovered. K2 also gives the opportunity to try to detect the phase effect due to the rotation of the planet (from inhomogeneity in its atmosphere).

We also identified two solar-like planet-hosting stars that are most probably too faint to yield oscillation detection (perhaps WASP-75 given its early type will reveal its large separation, which yields the stellar average density) but that are very interesting for exoplanet studies. **Short-cadence observations** are needed to detect the potentially observable oscillations and are the best for exoplanet studies (see the proposal of Hellier, Southworth & the WASP collaboration):

- WASP-75 (EPIC206154641, Kp=11.3): F9 star, with a transiting hot Jupiter planet: 1.07 M_{Jup}, 1.27 R_{Jup}, P_{orb}=2.48 d. Short-period transiting planet, so an excellent target for exoplanet studies.
- WASP-47 (EPIC206103150, Kp=11.76): G9 star, with a transiting hot Jupiter planet: 1.14 M_{Jup}, 1.15 R_{Jup}, P_{orb}=4.16 d. Short-period transiting planet.

Finally, we identified one planet-host subgiant/red-giant star. It is interesting for asteroseismology and for characterizing the nature of the companion. Given the oscillation periods expected, only **long-cadence observations** are needed:

- HD212771 (EPIC205924248, Kp=7.72): G8 red giant star harboring a massive planet of 2.3±0.4 M_{Jup} in a 373 d orbital period. An excellent target for asteroseismology, including attempting to measure the rotation of the star from mode splittings. No planetary transits discovered so far. K2 also gives the opportunity to attempt to detect the phase effect due to the rotation of the planet (from inhomogeneity in its atmosphere).